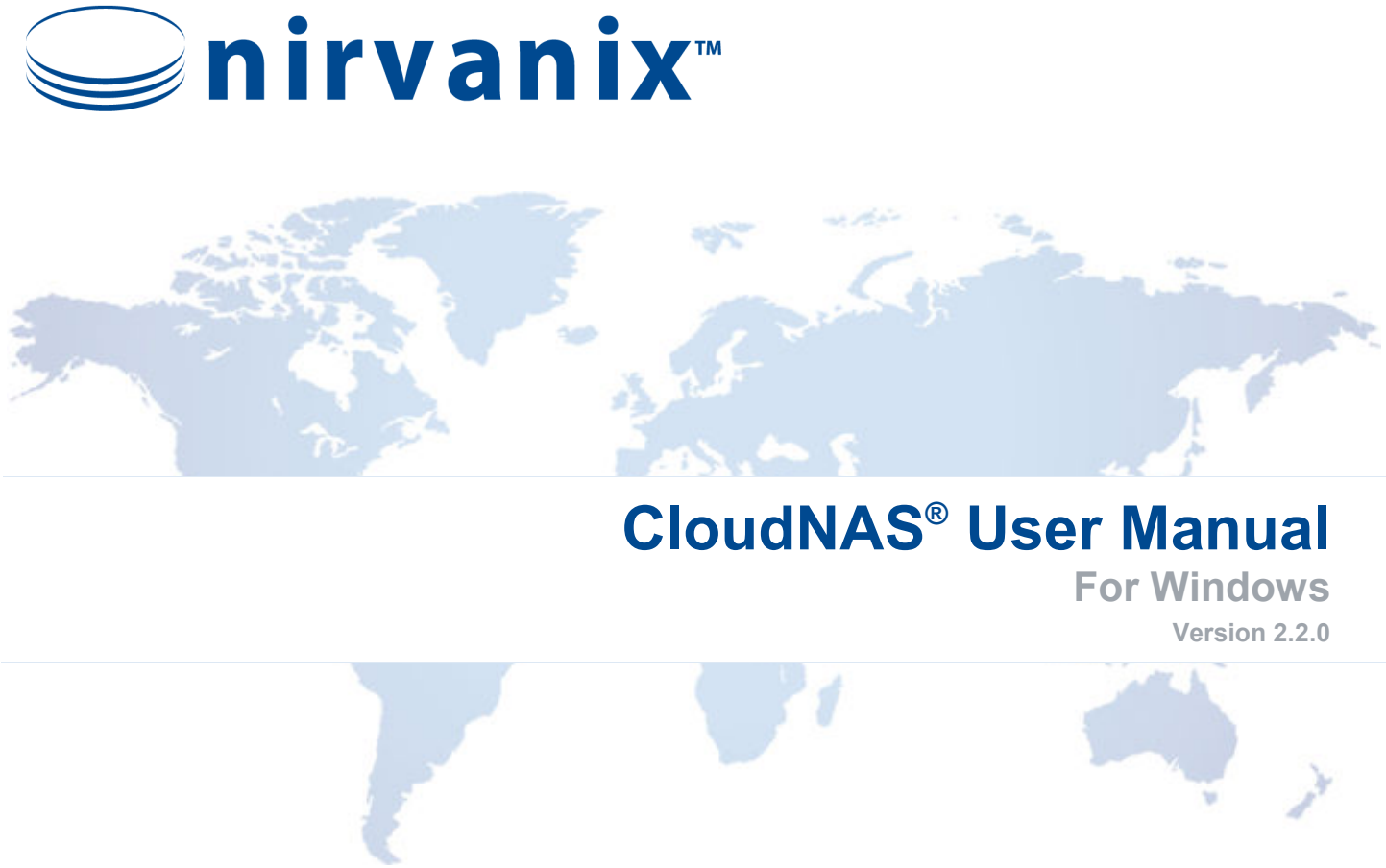


CloudNAS® User Manual

For Windows

Version 2.2.0

Neither this document nor any part of it may be copied or reproduced in any form or by any means without the prior written consent of Nirvanix, Inc. The information contained in this document is subject to change or revision without prior notice. © Copyright 2008 – 2010 Nirvanix, Inc. All rights reserved.

Table of Contents

1. Overview 3
2. System Requirements 3
3. Product Activation 4
4. Installation Instructions 5
4.1 Installation 5
4.2 Mount / Unmount 5
4.3 Accessing Your Mounted File System 5
4.4 Uninstallation 6
5. Configuration 7
5.1 Upload Monitor 7
5.2 Buffer & Cache 8
5.3 Encryption 9
5.4 Automatic Software Updates 10
5.5 Custom Configuration 11
6. Modules and Functional Descriptions 14
6.1 Upload Buffer & Read Cache 14
6.2 Cache Disabled and Write Operations 14
6.3 Logging 14
7. Known Issues 15
8. Troubleshooting 17
8.1 Activation 17
8.2 Performance 17
8.3 File Access 17
8.4 Mounting / Unmounting 17
Appendix I – Advanced Configuration 18

© 2008 – 2010 Nirvanix, Inc. All Rights Reserved.

1. Overview

Nirvanix CloudNAS® for Windows provides local file system access to a Nirvanix Storage Account. This creates a seamless, secure Cloud Storage target for many backup applications.

2. System Requirements

- Server-class hardware with minimum 2 GHz processor, 2 GB RAM

  Cache Enabled (default)
  The greater of four times the largest single set of files that will be copied to CloudNAS at the same time or a minimum of 200 GB.
  Note: Cache must be enabled for use of CloudNAS encryption.

  Cache Disabled
  100 GB free disk space recommended.

- Windows Server 2008 (32-bit); Windows Server 2003 (32-bit); Windows XP (32-bit)

- .NET Framework 3.5 SP1

- High-speed internet connection &
  Ports 80 (HTTP) and 443 (HTTPS) must be open and accessible for the domains listed below. These settings may need to be applied to corporate firewalls and/or proxies:

  - services.nirvanix.com

  - node*X*.nirvanix.com – "*X*" is a numeric designation of the nodes in the Nirvanix SDN currently covering "1" though "5"

  - Any Virtual URLs that have been set-up for your account in the Nirvanix SDN

© 2008 – 2010 Nirvanix, Inc. All Rights Reserved.

3. Product Activation

To use CloudNAS, your Nirvanix Account must be enabled to allow application activation and ensure proper update notifications. If your account is not CloudNAS enabled or if you are not sure, contact Nirvanix support to confirm the status of your account.

If the version of Nirvanix CloudNAS that you are running has an update, the technical contact for your account will receive a notification. On occasion Nirvanix may issue mandatory updates for CloudNAS.

© 2008 – 2010 Nirvanix, Inc. All Rights Reserved.

4. Installation Instructions

The installation of Nirvanix CloudNAS requires a few steps that will allow you to get started quickly and easily. To complete the installation, please have the following information on hand:

a) Account username

b) Account password

c) Application Name

d) Application Key

4.1 Installation

To install the Nirvanix CloudNAS you should execute the following steps:

1. Download the installer and save it to your desktop or other easily accessible location on the target computer or accessible LAN.

2. Run the installer and provide the requested information to complete the configuration process.

4.2 Mount / Unmount

To mount the Nirvanix CloudNAS you should execute the following steps.

1. Run the Windows Services console and start the CloudNAS service.

To unmount the Nirvanix CloudNAS you should execute the following steps:

1. Run the Windows Services console and stop the CloudNAS service.

4.3 Accessing Your Mounted File System

After installation is successfully completed, your mounted files are accessible at the drive letter you choose. For example:

F:\[account name]

The drive letter itself will be labeled “accountName@appName”.

© 2008 – 2010 Nirvanix, Inc. All Rights Reserved.

4.4 Uninstallation

After uninstalling the Nirvanix CloudNAS, any files uploaded to the SDN will remain on the SDN. If you need to delete or copy files already on the SDN, this should be completed prior to uninstalling the CloudNAS. If you do not, you may need to reinstall the CloudNAS to do so.

To uninstall the Nirvanix CloudNAS you should execute the following steps:

1. Run Uninstall.exe from the nirvanix installed folder (i.e. C:\Program Files\Nirvanix\Nirvanix CloudNAS).
   Note: The cache will be left on the system and must be deleted manually. See "Buffer & Cache" in the Configuration section for the cache location.

© 2008 – 2010 Nirvanix, Inc. All Rights Reserved.

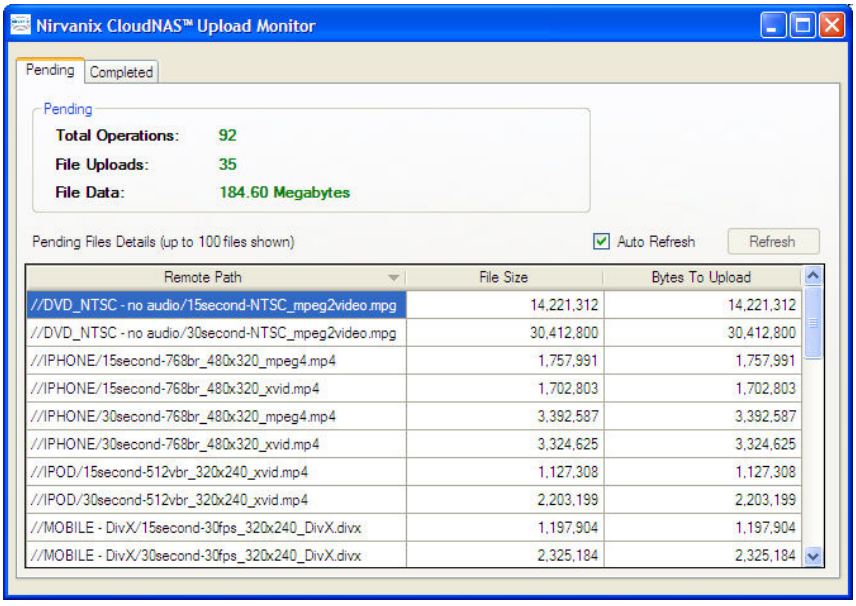
5. Configuration

The Information here will help you configure and use your Nirvanix CloudNAS.

5.1 Upload Monitor

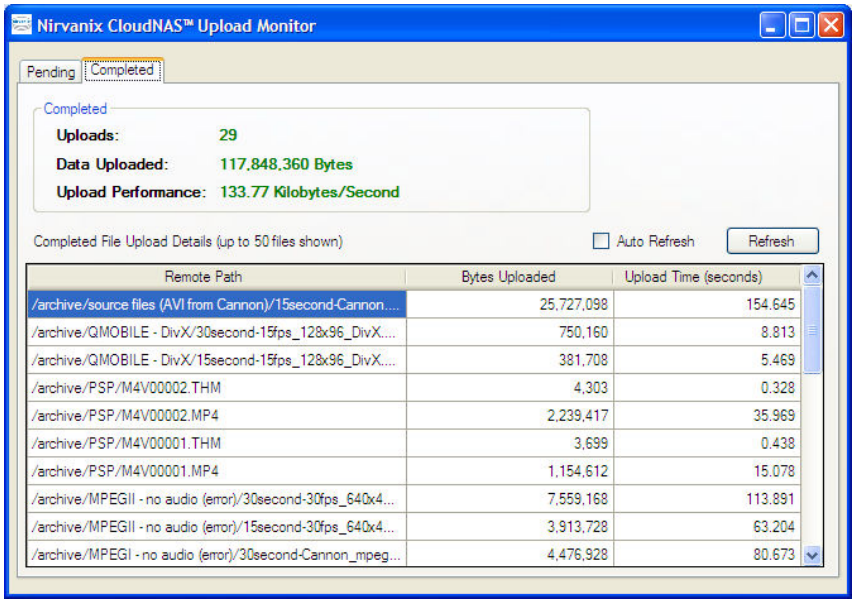
If the Nirvanix CloudNAS is running with caching enabled, the status of file uploads may be tracked using the Upload Monitor. Simply confirm that CloudNAS is mounted and accessible and then launch the Upload Monitor from the Start menu or by going to the directory in which the CloudNAS was installed.

The upload monitor has two tabs. The first tab will display the number files uploading, remote Nirvanix path of each file uploading, the bytes remaining to upload, and the number of pending commands.



© 2008 – 2010 Nirvanix, Inc. All Rights Reserved.

The second tab displays completed uploads showing the remote Nirvanix path, file size, upload time in seconds per file, along with basic upload performance for the files transferred to the SDN since the CloudNAS installation was started. Restarting CloudNAS will reset the upload performance metric.



5.2 Buffer & Cache

The Nirvanix CloudNAS is configured to run with caching enabled when initially installed. The default cache directory on a standard Windows installation is “C:\Documents and Settings\All Users\Application Data\Nirvanix”. The Nirvanix CloudNAS cache directory location can be changed with the optional Cache.BasePath config setting which may be edited manually or using the configuration interface.

IMPORTANT: Windows CloudNAS requires locally attached drives for cache. CloudNAS runs as a service which MS Windows security implementation blocks from accessing mapped network drives: http://support.microsoft.com/kb/180362

The default cache settings will use 25% of the available space on the designated partition. These settings can be changed to a different percentage or to a specific amount designated in MBs (megabytes). Information on changing these settings can be found in the Cache & Buffer section of Custom Configuration.

The cache also holds directory information to enable faster data access and improve performance. If you are using more than one CloudNAS to access the same storage repository it is possible for the cache to become out of sync. This increases the risk of collisions if one CloudNAS is overwriting a file as another is still updating it. The same problem may be seen if accessing the same repository through any other interface other than the CloudNAS. There are

© 2008 – 2010 Nirvanix, Inc. All Rights Reserved.

configuration changes that can be made to minimize this risk however they do create some tradeoffs on performance. Please contact the Nirvanix support team for more information.

Configuration options related to buffer & cache are further detailed in Section 5.5.

5.3 Encryption

As an added security feature, the Nirvanix CloudNAS supports the encryption of data for storage on the SDN. This feature uses industry standard AES and supports up to 256-bit keys that are user generated. This is separate from and can be used in addition to an optional encrypted Secure Sockets Layer (SSL) connection which secures the transfer of data from the CloudNAS to the SDN.

To enable encryption you will need to create the following settings in the “cloudnas.conf” file. Please see the “Custom Configuration” section (5.5) of this manual for additional details:

- Encryption.Enable=True
- Encryption.Key.Path=etc\encryption.key [or you can designate an alternate location]
- Encryption.InitialVector.Path=etc\encryption.iv [or you can designate an alternate location]

IMPORTANT: Nirvanix cannot help decrypt data. Please store encryption keys, chunk sizes, and initial vector information in a safe place and manage it appropriately.

IMPORTANT: When using CloudNAS encryption, the software encrypts and stores files in fixed-size chunks for efficient access. As a result, data encrypted using CloudNAS can only be decrypted with an installation using the same chunk size, encryption key, and initial vector. Other methods of accessing data on the SDN will not be able to decrypt data.

Some additional information to know about the Nirvanix CloudNAS encryption feature:

- Changing the encryption keys in CloudNAS does not update the encryption of data already transferred to the SDN. You must download and decrypt the data using the old keys and then re-upload and encrypt it again if you would like the keys to be the same.
- Encryption is only supported if the CloudNAS buffer cache is enabled. Enabling encryption automatically overrides file buffer cache settings enabling buffer caching as well.
- Data corruption will occur if you attempt to modify or edit CloudNAS encrypted data using CloudNAS with cache disabled.

© 2008 – 2010 Nirvanix, Inc. All Rights Reserved.

- Enabling encryption may negatively affect upload performance.
- The Key file must be 16 bytes (128 bits), 24 bytes (192 bits), or 32 bytes (256 bits).
- The Initial Vector file must be 16 bytes (128 bits).
- Use of encryption is not compatible with SDN features such as search, transcode, and image manipulation.
- The encryption process is applied to the data stream on the local machine as it is uploaded to the SDN. Data in the Nirvanix CloudNAS cache on the local machine is not encrypted.

5.4 Automatic Software Updates

CloudNAS periodically checks with the Nirvanix SDN to see if there is a new version available and has the ability to update itself to the latest recommended release. This is a configurable setting and has the following options:

1. Notify – Notify the account technical contact of an available update.
2. NotifyDownload **[Default setting]** – Notify the account technical contact of an available update and download the update so that an administrator can run it manually.
3. NotifyDownloadUpdate – Notify the account technical contact of an available update, download the update, and automatically run the installation/upgrade process based on the day/time setting configured for the CloudNAS instance.

Only one notification is sent per available update regardless of the number of CloudNAS instances running under that account.

Nirvanix classifies new releases into two groups: 1) Recommended/Critical; 2) Mandatory. Virtually all updates will fall into the first group and will cover simple patches as well as incremental version and functionality releases. These are handled as part of the normal update process. The second group is reserved for situations where a specific version of CloudNAS is found to cause data inconsistencies or undue impacts to the SDN. In this situation, deployed instances of that version will no longer be able to synchronize with the SDN and the installation must be updated to restore normal CloudNAS operations.

Automatic updates must be configured to run on a specific day of the week at a set time. This is to allow administrators to set the installation to coincide with recurring maintenance windows that are already in use.

Configuration options related to automatic software updates can be found in Section 5.5.

© 2008 – 2010 Nirvanix, Inc. All Rights Reserved.

5.5 Custom Configuration

The configuration file has a number of different values that will let you change the overall behavior of Nirvanix CloudNAS and allow specific settings to be changed. Each time you change the configuration you will need to restart the service or remount the drive.

Misspelling settings or values and incorrect case usage will cause the setting to be quietly ignored. The same is true if extra characters are included in the configuration setting line.

Configuration settings are placed into the cloudnas.conf file in the installation directory which is commonly “C:\Program Files\Nirvanix\Nirvanix CloudNAS\etc”. Each setting is a separate line with the format: setting=value.

Example of settings as they appear in “cloudnas.conf”:

```
Log.File.Enable=true
Log.Level=Warning
```

Below is a formatted list of configuration values and their meanings:

Encryption

Setting: Encryption.Enable
Default Value: false
Definition: Enables encryption when true. If cache is disabled the encryption process fails upon configuration and the CloudNAS will exit with an error message.
Example: Encryption.Enable=false

Setting: Encryption.Key.Path
Default Value: etc\encryption.key
Definition: The path containing the key for encryption purposes. May be a relative or absolute path.
Example: Encryption.Key.Path=etc\encryption.key

Setting: Encryption.InitialVector.Path
Default Value: etc\encryption.iv
Definition: The path containing the seed value for the encryption algorithm.
Example: Encryption.InitialVector.Path=etc\encryption.iv

Web Services

Setting: Nirvanix.WS.SecureFileTransfer
Default Value: false
Definition: Forces all calls to use an encrypted SSL connection over HTTP when true. If false, only authentication calls use an encrypted SSL connection.
Example: Nirvanix.WS.SecureFileTransfer=false

© 2008 – 2010 Nirvanix, Inc. All Rights Reserved.

Logging

Setting: Log.File.Enable
Default Value: true
Definition: When true the file system will log to files located in "Log.File.Dir".
Example: Log.File.Enable=true

Setting: Log.File.Dir
Default Value: log
Definition: The directory that holds log files. By default it will be placed relative to your installation directory.
Example: Log.File.Dir=log

Setting: Log.Level
Default Value: Info
Definition: The level of logging verbosity. Valid values are "Error", "Warning", and "Info".
Example: Log.Level=Info

Software Updates

Setting: SoftwareUpdate.DownloadDirectory
Default Value: The current working directory of the CloudNAS installation.
Definition: The local path to where new software versions are automatically downloaded.
Example: SoftwareUpdate.DownloadDirectory=C:\Path\to\CloudNAS\

Setting: SoftwareUpdate.Policy
Default Value: NotifyDownload
Definition: The policy to use when applying a software update. Valid values are "Notify", "NotifyDownload", or "NotifyDownloadUpdate".
Example: SoftwareUpdate.Policy=NotifyDownload

Setting: SoftwareUpdate.Policy.UpdateSchedule
Default Value: null
Definition: This is required and only applicable when SoftwareUpdate.Policy is set to "NotifyDownloadUpdate" and the update is "Recommended". The format is as follows and is not case sensitive:

Daily.[time]	i.e.	Daily.14:30
Weekly.[day].[time]	i.e.	Weekly.Tuesday.22:10

Example: SoftwareUpdate.Policy.UpdateSchedule=Daily.14:30

© 2008 – 2010 Nirvanix, Inc. All Rights Reserved.

Buffer & Cache

Setting: Cache.LocalDisk.Enable
Default Value: true
Definition: When true, this setting uses a read/write cache located on the local machine at "C:\Documents and Settings\All Users\Application Data\Nirvanix". This setting allows for random writes along with increased performance. A false value will read and write directly with the cloud.
Example: Cache.LocalDisk.Enable=true

Setting: Cache.BasePath
Default Value: C:\Documents and Settings\All Users\Application Data\Nirvanix
Definition: This is the base path containing read cache and upload buffer files. Pending SDN operations are also stored here. Do NOT change this setting without ensuring you have no pending operations or uploads. This can be verified with the Upload Monitor.
Example: Cache.BasePath=C:\Documents and Settings\All Users\Application Data\Nirvanix

Setting: UpdateService.BufferLimit.MB
Default Value: 25%
Definition: The buffer limit can be set in megabytes (example: "100") or as a percentage (example: "25%") available of the designated partition capacity. If this limit is exceeded when writing to the buffer, all files attempting to write will fail.
Example: UpdateService.BufferLimit.MB=25%

Setting: Cache.Persistence.MB
Default Value: [The UpdateService.BufferLimit.MB value]
Definition: The maximum amount of read cache storage in megabytes that is persisted. Anything beyond that will be removed from cache with the least recently accessed files removed first.
Example: Cache.Persistence.MB=1000

© 2008 – 2010 Nirvanix, Inc. All Rights Reserved.

6. Modules and Functional Descriptions

6.1 Upload Buffer & Read Cache

CloudNAS performs reads and writes on local disk to greatly increase performance. It utilizes both an upload buffer and a read cache. The upload buffer is file data that has been written locally and is pending upload to the SDN. The read cache is SDN file data that is accessible locally for read operations.

All application write requests to CloudNAS are written to the upload buffer and can be read immediately as read cache. After an application writes and closes a file, the file is queued for upload to the SDN as a background task. The upload queue may contain many files. You can use Upload Monitor to see an instant snapshot of this.

The UpdateService.BufferLimit.MB configuration sets the total maximum size of all file data that can be queued for upload. If this limit is reached, any application create file requests will succeed but write requests will return back a failure code.

All pending SDN operations are saved to local hard disk. This is to provide protection in case the machine crashes, powers off, or you stop CloudNAS before it is able to process all of your operations. The next time CloudNAS starts, all pending and partially completed SDN operations will resume.

As you read a file from the SDN, the file data is stored locally in the read cache. This allows follow up reads to be done at local disk speed. The configuration option “Cache.Persistence.MB” sets the size of the cache. When the cache is full, files that have been completely uploaded to the SDN may be removed. Files are removed based on last accessed time with older files getting flushed first. Files in the upload buffer are not affected by this setting.

6.2 Cache Disabled and Write Operations

In this mode, your application may read from any offset within a file when reading. However, file writes must be sequential and an error will occur on any file seeking activity during a write. If the application you are using to move data into the CloudNAS requires non-sequential read and write, you will need to enable the cache.

6.3 Logging

If enabled, all logging is done to several files within your log folder. The default location for the log folder is the installation directory. It should be viewable by any log viewer or text editor.

© 2008 – 2010 Nirvanix, Inc. All Rights Reserved.

7. Known Issues

The following are known issues for this release.

- File/Folder modifications made outside of a specific CloudNAS instance will not be immediately reflected in that instance. This is the result of caching optimizations that improve CloudNAS performance. Modifying data directly from the Nirvanix API or from other clients, including other CloudNAS instances, may create inconsistencies and cause problems for CloudNAS as well as applications using it to access the SDN.
- Data that is encrypted using Nirvanix CloudNAS can only be decrypted using Nirvanix CloudNAS.
- When encryption is enabled and a file or folder is copied or moved from one directory in the CloudNAS to another in the same mounted drive, Windows will display the following message: "The file filename cannot be copied or moved without losing its encryption. You can choose to ignore this error and continue, or cancel."

  This message is the result of an error in the assumptions that Windows makes when interacting with the driver used by CloudNAS. The file will in-fact remain encrypted and the message can be ignored.
- Corruption may occur if the CloudNAS cache is deleted while the CloudNAS is running or while the Update Monitor shows any pending commands.
- File Locking is not supported.
- When attempting to a move a file to a folder already containing a different file with that same name, you will not be prompted with an overwrite warning. The file will be moved successfully and replace the previous file.
- Applications that use “Truncate” or “Set File Length” are not supported when in direct mode.
- The Nirvanix SDN is not case sensitive. This means you may not rename a file to new name where only the case differs (e.g. change “SomeFile” to “somefile”).
- Many file systems support and allow for file paths longer than the SDN supported 512. In cases where this occurs in the CloudNAS, you may receive an error.
- Certain file systems and programs do not allow you to use a file/folder with name of length 256 characters. You may experience issues if you exceed their respective limits.

© 2008 – 2010 Nirvanix, Inc. All Rights Reserved.

Following is one example:

  - Many Windows programs will restrict the whole file path (not just the filename) to the MAX_PATH variable of 256 chars. See the following Microsoft Knowledge Base article for more details: http://support.microsoft.com/kb/177665

- NTFS Alternate streams are not supported.
- All file are opened with a ReadWrite access mode and a ReadWrite sharing mode regardless of what is requested.
- Sharing a mapped drive has been found problematic and causes errors for many applications. It is recommended to use UNC paths for accessing Windows CloudNAS installations across a network.
- When sharing a drive to other machines and the service is restarted, the shared connection will return an error unless it is reconnected or remapped.

© 2008 – 2010 Nirvanix, Inc. All Rights Reserved.

8. Troubleshooting

The following information may be helpful in diagnosing and resolving common problems. Some items may touch multiple categories but will only appear under the category that is most appropriate.

8.1 Activation

- CloudNAS will not start
  Check the network connection and make sure you are able to connect the Nirvanix domains outlined under *System Requirements*.

- Cannot ping required Nirvanix domains
  Please check the firewall settings for the machine hosting CloudNAS and for the network connecting it to the internet. You may need to update the firewall settings to allow access to the specified domains and ports defined under *System Requirements*.

8.2 Performance

- Slow uploads to the SDN
  Often this is caused by network connection problems or server configurations.

- High CPU utilization
  CloudNAS was created for installation on a dedicated server and to transfer data to the Nirvanix SDN as fast as possible. Because transferring of data requires use of the CPU, high-bandwidth connections are likely to see higher CPU utilization. Use of the encryption feature will further increase CPU load.

8.3 File Access

- Copying files to CloudNAS fails
  The Nirvanix SDN does not allow the use of certain characters in the file path. To avoid any conflicts when running asynchronously, CloudNAS filters for and rejects any invalid paths. It will reject paths with leading or trailing spaces in the file or folder name, or with any of the following characters: \ / : ? | * " < >

8.4 Mounting / Unmounting

- Cannot mount drive or share
  Verify that your account and activation credentials are correct. To do so, launch the Nirvanix CloudNAS Configuration application and re-enter your information.

- Application cannot access or gives errors when accessing shared CloudNAS drive
  Sharing a mapped CloudNAS instance has been found to be problematic. When accessing across the network, UNC paths are the recommended option.

© 2008 – 2010 Nirvanix, Inc. All Rights Reserved.

Appendix I – Advanced Configuration

These settings are not normally required. Please contact Nirvanix if you intend to use any of them.

Cache & Buffer

Setting: UpdateService.PartLength.MB
Default Value: 10
Definition: The segment of file dedicated each upload segment. File segments will be uploaded sequentially to the upload buffer.
Example: UpdateService.PartLength.MB=10

Setting: Cache.DirectoryStale.Mins
Default Value: 10080
Minimum Value: 4
Definition: The time in minutes CloudNAS waits to remove a directory from cache and eventually retrieve from the Nirvanix Web Services. The default value is equivalent to 7 days.The lower this value, the more often directory information is refreshed from the Nirvanix SDN.
Example: Cache.DirectoryStale.Mins=10080

Setting: Cache.DirectoryExpiration.Mins
Default Value: none
Minimum Value: 4
Definition: The time in minutes CloudNAS waits to remove a specified directory from cache and eventually retrieve from the Nirvanix Web Services. Directories and cache expiration are displayed in a comma and double slash delimited format.
Example: To specify a cache expiration for SDN folder /child1/foo of 5 minutes and SDN folder /child2/bar of 6 minutes, you would specify the following: Cache.DirectoryExpiration.Mins/child1/foo//5,/child2/bar//6

Other

Setting: Storage.MaxReported.GB
Default Value: 102400
Definition: The maximum reported size of the CloudNAS volume. This can be viewed using the df command.
Example: Storage.MaxReported.GB=102400

Setting: UploadMonitor.MaxCompletedUploadsHistory
Default Value: 50
Definition: This is the maximum number of completed uploads displayed with the most recently completed displayed first. The minimum value is 1 and the maximum value is 200.
Example: UploadMonitor.MaxCompletedUploadsHistory=50

Setting: UploadMonitor.AutoRefreshSeconds
Default Value: 5
Definition: This is the number of seconds between automatic refreshes of the monitoring application. The minimum value is 1.
Example: UploadMonitor.AutoRefreshSeconds=5

© 2008 – 2010 Nirvanix, Inc. All Rights Reserved.